3

Responsivity Education/ Prelinguistic Milieu Teaching

STEVEN F. WARREN, SHELLEY L. BREDIN-OJA, MARTHA FAIRCHILD, LIZBETH H. FINESTACK, MARC E. FEY, AND NANCY C. BRADY

ABSTRACT

Responsivity education/prelinguistic milieu teaching (RE/PMT) is most appropriate for children who are functioning developmentally between the ages of approximately 9 and 15 months. Many children with developmental delays do not reach this developmental period until they are 2 or 3 years of age. RE/PMT consists of two components: prelinguistic milieu teaching (PMT), which is delivered by the clinician to the child, and responsivity education (RE), which is delivered by the clinician to the parents. PMT is designed to increase the frequency and complexity of intentional *nonverbal* communicative acts to set the stage for later language learning. Our approach assumes that many parents may not be optimally responsive to the nonverbal communicative bids of their children. Consequently, we provide the second component, RE. In this chapter, we describe the structure of our approach and its theoretical and empirical bases, and we present several issues that clinicians must consider to use the intervention effectively.

INTRODUCTION

Throughout the first year of life, the building blocks for language development are assembled. Auditory development accelerates, complex babbling emerges, social responsiveness and receptive language skills blossom, and with the onset of coordinated attention, intentional communication appears, first in only nonverbal forms (e.g., proto-declaratives such as pointing at

Support for much of the research reported in this chapter was provided by grants from the National Institute of Child Health and Human Development (R01 HD27594; R01 HD34520) and the Office of Special Education Programs of the U.S. Department of Education (H023C20152; H0324C990040). We would like to acknowledge the central role played by Paul Yoder in much of the research described here and also acknowledge the support for this research provided by the NICHD Mental Retardation Research Centers at the University of Kansas and Vanderbilt University.

a plane overhead to draw the parent's attention to it and thus create joint attention). These developmental breakthroughs typically occur by 9 or 10 months of age, well before children utter their first spontaneous words (Bates, Benigni, Bretherton, Camaioni, & Volterra, 1979). A significant delay in the emergence of these building blocks of communication is a strong indicator that the onset of productive language will also be delayed (McCathren, Warren, & Yoder, 1996). The basic premise of the two-component intervention (RE/PMT) approach we present in this chapter is that prelinguistic communication development establishes the foundation for later language development. We further assume that, when prelinguistic communication development is delayed or disordered, a carefully targeted and well-implemented treatment program can help to develop the critical intentional communication skills necessary for early language intervention to be maximally effective. In this chapter, we address issues related to identification of candidates for RE/PMT, discuss the theoretical and empirical bases for the approach, and describe the practical requirements for this intervention and its key components. We conclude by presenting our ideas on how children's progress with prelinguistic intervention can be monitored, how the procedures can be accommodated to a family's cultural and linguistic differences, and future directions in the development and use of the approach.

TARGET POPULATIONS AND ASSESSMENTS FOR DETERMINING TREATMENT RELEVANCE AND GOALS

RE/PMT is designed for young children who have not yet become frequent, clear prelinguistic communicators by approximately 12–18 months of age. By this age, and even earlier for children with severe developmental delays such as those with Down syndrome, speech-language pathologists (SLPs) can conclude that some form of intervention to facilitate communication development is likely to be beneficial, if not necessary. Research on RE/PMT has focused on children with a mental age of at least 9 months (Warren & Yoder, 1998; Yoder & Warren, 2001; Yoder, Warren, & Hull, 1995). However, the primary issue in assessment usually is not whether children are too delayed, but whether they are already too advanced. Applying the intervention with children for whom early *language,* rather than *communication* intervention is more appropriate would be a serious miscalculation (Yoder & Warren, 2002). RE/PMT is appropriate for children who need to increase their frequency of gestures and vocalizations. Children who already are frequent communicators will not gain substantially from this approach. Consequently, if there is reliable evidence that a child uses more than 10 words or signs productively or understands more than 75 words, we would typically recommend that intervention focus on expressive vocabulary (using speech or an alternative communication system), regardless of the child's existing intentional communication repertoire. Additionally, RE/PMT is not appropriate for chil-

dren who produce more than 1 or at most 2 spontaneous, intentional communication acts per minute in social play with an adult, especially if these acts typically include a canonical vocalization (i.e., a true consonant plus a vowel). These criteria for determining which children are too advanced for RE/PMT also serve as the guides for determining when it is time for them to move on into early language intervention. Yoder and Warren (2002) found that when RE/PMT was implemented with children who exceeded these criteria, the effects of intervention were minimal.

The Communication and Symbolic Behavior Scales (CSBS™) is an assessment instrument that has been developed specifically to describe the level of a child's prelinguistic communication skills (Wetherby & Prizant, 1993a, 1993b). This assessment has been independently shown to have very high reliability and predictive validity (McCathren, Yoder, & Warren, 1999, 2000; Wetherby, Allen, Cleary, Kublin, & Goldstein, 2002). Its primary drawback is the length of time it takes to apply and score all of the segments, which include assessments of comprehension and play skills. Obviously, if norm-referenced information is needed, especially for children who do not clearly have significant delays in communication development, administration of the entire test would be desirable (note that the CSBS is appropriate only up to 24 months developmentally). For our purpose of describing children's rate of communication and rates of different types of prelinguistic communication, we administer only the *communication temptations* and *sharing books* segments as part of our standard assessment. These two segments provide children with opportunities to request objects, request social interaction, comment about novel events, and repair communication breakdowns within a series of scripted play interactions. We videotape the interactions and later record and count the number of nonverbal requests (proto-imperatives) and comments (proto-declaratives) in order to determine whether a child is likely to benefit most from a RE/PMT (as opposed to a linguistically based intervention) and as a baseline for examining treatment outcomes.

THEORETICAL BASIS

The basic premises and hypotheses underlying RE/PMT stem from a transactional model of social communication development (McLean & Snyder-McLean, 1978; Sameroff & Chandler, 1975). This model presumes that early social and communication development are facilitated by bidirectional, reciprocal interactions between children and their environment. For example, a change in the child, such as the onset of intentional communication, may trigger a change in the social environment. Parents may be more inclined to repeat and expand the child's messages using words, a response we refer to as *linguistic mapping*. These changes then support further development in the child (e.g., increased communication and vocabulary) and subsequent changes in the caregivers input (e.g., more complex language interaction

with the child). In this way both the child and the environment change over time and affect each other in reciprocal fashion as early achievements pave the way for subsequent development.

A transactional model may be particularly well suited to understanding social-communication development in young children because caregiver–child interaction can play such an important role in this process. The period of early development (from birth to approximately age 3 years) may represent a unique time during which transactional effects can have a substantial impact on development. Specifically, the young child's relatively restricted repertoire during this period may allow any changes in behavior to be especially salient and observable to caregivers. This in turn may allow adults to be more responsive to the developing skills of the child than is possible later in development when children's behavioral repertoires are far more expansive and complex. During this natural window of opportunity, the relationship represented by the transactional model may be employed by a clever practitioner to multiply the effects of relatively circumscribed interventions and perhaps alter the very course of the child's development in a significant way. However, the actions of the practitioner may need to be swift and intense, or they may be muted by the child's steadily accumulating history.

To appreciate the true potential of transactional effects, consider that an input difference in positive affect expressed by parents toward their child of 10 events per day (a difference of less than 1 event per waking hour on average) will result in a cumulative difference of 10,950 such events over a 3-year period. A child who experiences less positive affect may also experience cumulatively more negative affect (e.g., "Stop that," "Get out of there," "Shut your mouth up," "You're a bad baby"). It is easy to conceive of the combination of these qualitative and quantitative experiential differences contributing to deficits in attachment, exploratory behavior, self-concept, language development, later school achievement, and so forth.

What evidence do we have that such large cumulative deficits occur and/or that they play havoc with social and communication development? Although the evidence is mostly correlational, it is nevertheless compelling. There is substantial evidence that young, typically developing children experience large differences in terms of the quantity and quality of language input they receive, and these differences correlate with important indicators of development later in childhood (e.g., vocabulary size, IQ, reading ability, school achievement) (Feagans & Farran, 1982; Gottfried, 1984; Hart & Risley, 1992; Prizant & Wetherby, 1990; Walker, Greenwood, Hart, & Carta, 1994). Because young children with developmental delays or sensory disorders often display low rates of initiation and responsiveness (Rosenberg & Abbeduto, 1993; Yoder, Davies, & Bishop, 1994), they also may experience input that differs substantially in quantity and quality from the input that high achieving, typically developing children receive despite the best intentions and efforts of their caregivers (Brooks-Gunn & Lewis, 1984; Crawley & Spiker, 1983).

The challenges faced by young children who initiate infrequently may be further multiplied if their caregiver(s) are or learn to be relatively unresponsive to their children's communicative efforts (e.g., Hart & Risley, 1995; Saxon, Colombo, Robinson, & Frick, 2000; Tamis-LeMonda, Bornstein, Baumwell, & Melstein Damast, 1996).

Caregivers who are unresponsive to their young child's initiations and/or who often display depressed or negative affect toward the child may represent a risk factor in terms of the child's emotional, social, and communication development (Landry, Smith, Miller-Loncar, & Swank, 1997). Unresponsive caregivers often have children who are insecurely attached (Ainsworth, Blehar, Waters, & Wall, 1978), which is a risk factor for poor social-emotional development (Bornstein, 1989). Furthermore, there is evidence that caregivers with low rates of responsivity toward their infants can negate or minimize the positive transactional effects of early intervention efforts because they fail to respond to changes in their child's repertoire being generated by the intervention (Mahoney, Boyce, Fewell, Spiker, & Wheeden, 1998; Yoder & Warren, 1998). In short, the generation of transactional effects likely depends on sensitivé, responsive caregivers who notice and nurture the child's growth.

The generation of strong transactional effects in which the growth of emotional, social, and communication skills is scaffolded by caregivers can have a multiplier effect in which a small dose of early intervention may lead to long-term effects. These effects are necessary when we consider that typical early intervention by a skilled clinician may represent only 1–2 hours per week of a young child's potential learning time (Bailey, Aytch, Odom, Symons, & Wolery, 1999). Even a relatively intense intervention of 5 hours per week of intensive interaction would represent just 5% of the child's available social and communication skill learning time if we assume the child is awake and learning 100 hours per week. Thus, unless direct intervention accounts for a large portion of a child's waking hours, transactional effects involving caregivers are necessary for early intervention efforts to achieve their potential.

In summary, RE/PMT is grounded in the assumption that prelinguistic skills form the foundation for later language skills. In addition, the transactional model of adult–child interaction serves as a mechanism by which enhanced prelinguistic development can serve as a scaffold for communication and language development. That is, if the child begins to produce more intentional communication acts and/or acts that are more complex (e.g., through PMT), parents should respond to those acts in ways that ultimately will encourage the child to reproduce and revise their acts. Some parents of children with developmental delays may develop patterns of responding to their children that are not optimal for their children's communicative development. Responsive interaction training may be useful to help them recognize and respond to even small changes in the topography of their children's communicative acts (Tannock, Girolametto, & Siegel, 1992). These inter-

actions set the stage for more communicative interactions that are higher in quality and, ultimately, for functional communication using words or signs.

EMPIRICAL BASIS

The initial explorations of the effects of PMT, one of the two key components of RE/PMT, by Yoder and Warren and their colleagues focused on just a few children and used single-subject (multiple baseline) designs. These studies showed that increases in the children's frequency and clarity of prelinguistic requesting following intervention were correlated with increases in linguistic mapping by teachers and parents who were naïve as to the specific techniques and goals of the intervention (Warren, Yoder, Gazdag, Kim, & Jones, 1993; Yoder, Warren, Kim, & Gazdag, 1994). In other words, the teachers and parents of children who increased their use of nonverbal requests increased their use of contingent responses that repeated, rephrased, or otherwise incorporated the presumed meaning of the child's act. Furthermore, children's intentional requesting targeted in these studies was shown to generalize across people, settings, communication styles, and time.

Based on the promising results of these initial small intervention studies, Yoder and Warren (1998, 1999a, 1999b, 2001) conducted a relatively large (N = 58) longitudinal experimental study of the effects of PMT on the communication and language development of children with general delays in development. Fifty-eight children between the ages of 17 and 32 months (mean = 23; SD = 4) with developmental delays and their primary parent participated in the study. The children were recruited from three early intervention centers in Tennessee. Fifty-two of the children had no productive words at the outset of the study; the remaining six children had between one and five productive words. All children scored below the 10th percentile on the expressive scale of the MacArthur-Bates Communicative Development Inventories (CDIs) (Fenson et al., 1993) and fit the Tennessee definition of developmental delay (i.e., at least a 40% delay in at least one developmental domain, or at least a 25% delay in at least two developmental domains).

The children were randomly assigned to one of two treatment groups. Twenty-eight of the children received PMT; the other 30 children received an intervention termed *responsive small-group* (RSG). Treatment sessions for both groups were 20 minutes per day, 3 or 4 days per week, for 6 months. PMT represented an adaptation of milieu language teaching (Kaiser, Yoder, & Keetz, 1992) that aimed to teach the form and functions of requesting and commenting. It consisted of the following key components: 1) following the child's attentional lead; 2) building social play routines (e.g., turn-taking interactions such as rolling a ball back and forth); 3) using prompts, such as time delays (e.g., after rolling the ball back and forth, withholding it until the child initiated a request to roll it); as well as 4) natural consequences to the child's acts (e.g., giving the child the desired ball).

PMT ⇒ best for C w/ responsive ...
RSG ⇒ " " C w/ unresponsive

RSG represented an adaptation of the responsive interaction approach. The adult played with the children in a highly responsive manner and commented on what they were doing but never attempted to elicit or prompt any communication function or form directly. Caregivers were kept naïve as to the specific methods, measures, records of child progress, and child goals throughout the study. This allowed Yoder and Warren to investigate how change in the children's behavior as a result of the interventions might affect the behavior of the primary caretaker and how this, in turn, might affect the child's development later in time. Data were collected at five points in time for each dyad: at pretreatment, at posttreatment, and 6, 12, and 18 months after completion of the intervention.

Although there were no significant main effects of either PMT or RSG, both interventions had a range of effects on intentional communication development among subgroups of the children. The treatment that was most effective depended on the pretreatment maternal interaction style and the education level of the mother (Yoder & Warren, 1998, 2001). For children with highly responsive and relatively well-educated mothers (i.e., 3–4 years of college), PMT was effective in fostering generalized intentional communication development. However, for children with relatively unresponsive and less well-educated mothers, RSG was relatively more successful in fostering generalized intentional communication development.

The two interventions differed along a few important dimensions that provide a plausible explanation for these effects. PMT uses a child-centered play context in which verbal or time delay prompts for more advanced forms of communication are employed as well as social consequences for target responses, such as specific acknowledgment (e.g., "That's right") and compliance (e.g., immediately giving the child a toy he or she had requested). RSG emphasized following the child's attentional lead and being highly responsive to child initiations while avoiding the use of direct prompts for communication. Maternal interaction style may have influenced which intervention was most beneficial because children may develop expectations concerning interactions with adults (including teachers and clinicians) based on their history of interaction with their primary caretaker. Thus, children with consistently responsive parents may learn to persist in the face of communication breakdowns, such as might be occasioned by a direct prompt or time delay, because their history leads them to believe that their communication attempts will usually be successful. On the other hand, children without this history may cease communicating when their initial attempt fails. Thus, children of responsive mothers in the PMT group may have persisted when prompted and learned effectively in this context, whereas children with unresponsive parents may not have. In contrast, when provided with a highly responsive adult who virtually never prompted them over a 6-month period, children of unresponsive mothers showed greater gains than did children of responsive parents receiving the same treatment. For these children, exposure to a highly

responsive adult was a novel experience that generated a high degree of initiation and responsiveness by them, apparently leading to the treatment response that was observed, which eventually washed out during the 12-month follow-up (Yoder & Warren, 2001).

The effects of maternal responsivity as a mediator and moderator of intervention effects rippled throughout the longitudinal follow-up period. Yoder and Warren demonstrated that children in the PMT group with relatively responsive mothers received increased amounts of responsive input from their mothers in direct response to the children's increased intentional communication (Yoder & Warren, 2001). Furthermore, the effects of the intervention with this group were found on the number of intentional communication acts (Yoder & Warren, 1998) and of requests and comments (Yoder & Warren, 1999b). These became greater with time and significantly affected measures of expressive (i.e., lexical density; expressive scores on the Reynell Developmental Language Scales [Reynell & Gruber, 1990]) and receptive language development (i.e., number of semantic relations understood; receptive scores on the Reynell Scales) 6 and 12 months after intervention ceased (Yoder & Warren, 1999a, 2001). This finding contrasts with the results of several early intervention studies in which the effects were reported to wash out over time (Farran, 2000).

Finally, two observations from the Yoder and Warren studies support the prediction of the transactional model that children's early intentional communication will elicit mothers' linguistic mapping, which in turn will facilitate children's vocabulary development. First, the amount of responsive input by the primary caregiver was partly responsible for the association between intentional communication increases and later language development (Yoder & Warren, 1999a). Second, there was a significant longitudinal relationship between maternal responsivity and expressive language development (Yoder & Warren, 2001).

The implications of the results achieved by the Yoder and Warren study (1998, 1999a, 1999b, 2001) are tempered by a more recent efficacy study (Yoder & Warren, 2002). This study involved 39 prelinguistic toddlers with developmental delays and their primary parent. As in the previous Yoder and Warren study, all children scored below the 10th percentile on the expressive scale of the CDIs (Fenson et al., 1993) and met the Tennessee definition for developmental delay. However, in this study 17 of the children (44% of the sample) had Down syndrome, whereas in the earlier Yoder and Warren study (1998) only 4 of 58 children had Down syndrome (7%). Half of the children were assigned randomly to a two-pronged treatment condition. In this condition, the children received PMT and the primary caretakers went through a training program intended to ensure that they used a highly responsive parenting style with their child. Results indicated that the parent-training component of the intervention did enhance parent responsivity.

However, the pattern of results in terms of various measures of child communication development varied by pretreatment characteristics, and on some measures the control group achieved growth superior to that of the intervention group. Although the exact reasons for these findings were unclear, post hoc analysis suggested that the criteria for entry into the study included children for whom the intervention may have targeted skills that were "too low." Specifically, the intervention accelerated growth in comments and lexical density if children began treatment with low frequencies on these measures, but it appeared to decelerate growth along these dimensions for children who began treatment with relatively high rates of comments and canonical vocal communication.

The most recent investigation of the effects of PMT and parent responsivity training has also produced the most positive results yet reported. Fey et al. (in press) systematically replicated the second Yoder and Warren study (Yoder & Warren, 2002) with 51 toddlers (average age 26 months at the start of the study) with developmental delays. Children were randomly assigned to either a combination of PMT and parent responsivity training or to receive only those services already provided by the community program in which they were enrolled. Twenty-six of the 51 participants had Down syndrome. Due to the ambiguous results obtained by Yoder and Warren (2002), three important procedural modifications were made. First, to be enrolled in the study, all children were required to have relatively low rates of prelinguistic commenting and canonical vocalizations because these characteristics were associated with the most positive outcomes in the second Yoder and Warren study (2002). Second, clinicians took special care to desist from persistent efforts to prompt requests when children were nonresponsive to such requests. Third, when a child produced a clearly intentional act, clinicians responded by complying with the request and by expanding it rather than modeling some additional behavior, such as a nonlinguistic vocalization.

Based on data collected at the end of 6 months of intervention, Fey et al. reported the first "main effect" of PMT plus parent responsivity training. Specifically, they reported a statistically significant increase in intentional communication relative to the community intervention group. The results obtained for comments and declaratives were not significant, but all adjusted means were greater for the intervention group. The positive effect on intentional communicative acts was also found to be statistically significant for the 13 subjects with Down syndrome when compared directly with the 13 Down syndrome subjects in the community intervention group. The clinical significance of this finding will ultimately depend largely on the extent to which these early gains are followed by later gains on verbal measures in this ongoing longitudinal investigation.

The initial longitudinal study by Yoder and Warren (1998, 2001) represents a relatively rare experimental example of children's influence on adults'

use of behavior that in turn fosters the child's further development (Bell & Harper, 1977). It supports the potential power of the transactional model, at least during the early period of development when children's behavior repertoires are small and their developmental history relatively short. Furthermore, it suggests that RE/PMT can be highly effective with children under some conditions. Alternatively, the second longitudinal study by Yoder and Warren (2002) suggests that this approach may be ineffective with children who have already attained a relatively high level of prelinguistic development. The recent Fey et al. (in press) study used more conservative entry criteria to ensure that a prelinguistic intervention was truly appropriate for the children's communication levels and also included minor but perhaps important modifications in the PMT intervention procedures. The main effect on intentional communication resulting from the intervention implemented by Fey et. al. suggests that these modifications were highly functional. Consequently, we present these same recommendations below.

PRACTICAL REQUIREMENTS

As noted, the RE/PMT we have been using and testing involves two components. First, the interventionist (e.g., an SLP or teacher) must be able to work on a one-to-one basis directly with the child several times per week until the child has acquired the necessary skills to be a frequent, clear prelinguistic communicator. Depending on the child's developmental profile, this may take anywhere from a few weeks to more than 6 months. In our clinical and research experience, the average prelinguistic intervention takes several months until the child achieves the exit criteria and goals can be shifted to productive vocabulary.

The second component is RE for the child's parents. As discussed previously, a relatively high degree of parental responsivity appears necessary to ensure that the direct training of the child's prelinguistic skills has maximal impact. We have found It Takes Two to Talk—The Hanen Program for Parents (see Chapter 4; Manolson, 1992) serves as an excellent approach for helping parents from many backgrounds to establish more responsive interaction patterns with their children. In general, we do not advocate teaching parents to use PMT procedures. Although these procedures require the adult to follow the child's lead and to be sensitive to the form and content of the child's communicative efforts, they also involve consistent efforts to push the child to higher levels of communication frequency and complexity. Many parents are reluctant to take on this role of teacher. Those who do sometimes find it difficult to separate their direct instruction roles as teachers and their highly responsive roles as parents and communication facilitators. Furthermore, this intervention is only appropriate for a few months for most children. However, a highly responsive parenting style that will naturally evolve as children grow and develop is appropriate under most conditions and sup-

ports the child's development across a wide range of related domains (Landry, Smith, Swank, Assel, & Vellet, 2001).

KEY COMPONENTS

Situations termed *enabling contexts* help to provide an optimal environment for highly responsive caregiver–child interaction and/or the use of specific teaching techniques. These contexts are the same for interventionists using PMT and for parents who adopt the role of responsive communicator in RE. The principles that help to create enabling contexts are 1) arrange the environment to increase opportunities for communication, 2) follow the child's attentional lead, and 3) build social routines in which the child and adult play predictable roles. These principles are applied at all levels of the intervention to encourage a high degree of engagement by the child and to create frequent teaching interactions between the child and the adult. The basic formats for implementing these principles were developed for use in naturalistic early language intervention approaches such as milieu teaching (Warren, 1991) and responsive interaction training (Wilcox & Shannon, 1998).

Arranging the Environment

Children are most likely to initiate communicative acts about things they need, want, or find novel and interesting (Hart & Risley, 1968). Arranging the environment so that it naturally supports the need to communicate can increase the frequency of these states, thus giving the child more opportunities to communicate. This, in turn, gives the interventionist more opportunities to focus on the clarity and complexity of these acts. For example, adults can place desired items (e.g., food, toys) either out of reach of the child or in a context in which adult assistance is necessary to access them. This often happens quite naturally in homes and child care environments in which the child's interests and patterns of action are readily observable. The environment can then be arranged so that the child's expectations are challenged. In a classroom context, certain toys might be kept in clear plastic containers with lids on them that children cannot open without adult assistance (see DVD Clip 12). Crayons might be placed on the floor next to the adult where the child can see them but cannot easily reach them. Extra cupcakes might be placed in clear view but beyond the child's reach. Alternatively, containers and shelves that typically bear the child's toys and objects of interest can be emptied or filled with new, unanticipated items. Positioning should also be considered when trying to create enabling contexts. Positioning refers to how an adult places his or her body in relation to the child's body and a focal object. To the extent possible, the clinician should directly face the child and focal object at the child's eye level. With infants and toddlers, this may mean

the adult will need to lie on the floor with the child or sit on the floor while the child sits on a couch or a chair (see DVD Clip 4). This type of close, face-to-face contact facilitates coordinated joint attention between the adult and child (MacDonald, 1989). Sitting behind or above the child makes this type of interaction more difficult.

Following the Child's Attentional Lead

Young children attend more closely to objects or events of their choosing, rather than to objects or events of an adult's choosing (Bruner, Roy, & Ratner, 1980). Furthermore, young children have difficulty deploying their attention on command for longer than very short periods (Goldberg, 1977). Thus, following the child's attentional lead, a universal tenet of virtually all naturalistic early communication and language intervention approaches (Fey, 1986; Hepting & Goldstein, 1996), is used to sustain the child's interest in activities and social interaction. In practice, this might mean that the adult plays with toys or engages in activities of interest to the child (typically selected by the child from an array of choices) in a manner similar to the child's play. Children who are passive and engage in low rates of action, or children who engage in repetitive behavior, can make it challenging to maintain this procedure. Adults can easily lapse into directive styles in which they dominate most interaction episodes with the child. Our experience suggests that if the goal is to build initiations, then it is far better to simply adapt one's behavior to the child's initiation rate even if it is low. This technique is easier to implement if the adult has made some effort to arrange the environment to increase the likelihood that the child will attend and react spontaneously to target stimuli in the intervention context.

Contingent motor imitation is a technique that can be quite helpful with a young child who seldom initiates (Gazdag & Warren, 2000). Contingent motor imitation is an exact, reduced, or slightly expanded imitation of the child's motor production that is performed by the adult immediately following the child's motor production. It represents a specific form of following the child's attentional lead. This simple technique may be used at the start of intervention to establish a basic form of turn taking between the child and adult that over time can be transformed into interaction and play routines. Contingent imitation may benefit children because it allows them to regulate the amount of social stimulation received, it increases the probability that adult input will be easily processed and understood (Dawson & Lewy, 1989), it may encourage children to imitate adult behavior on a broader scale (Snow, 1989), and it may result in more differentiated play schemes (Dawson & Adams, 1984).

Contingent vocal imitation offers many of the same advantages and benefits as contingent motor imitation. It occurs when adults follow children's nonverbal vocalizations that are independent of communicative content with

a partial, exact, or modified vocal imitation. For example, a child might vocalize [ga] while holding a plastic ring by her face, making no obvious attempt to share the act with the adult. In this case, the adult might immediately imitate [ga], or [gaga], as a form of vocal play or turn taking (see DVD Clip 1). This type of vocal imitation (as with motor imitation) allows children to regulate the amount of social stimulation they receive and may encourage children to increase their rate of vocalization and to imitate adult vocalizations spontaneously (Gazdag & Warren, 2000).

Social Routine Building

Social routines are repetitive, predictable turn-taking games and rituals, such as Peekaboo and Pat-a-cake. Arranging the environment and following the child's attentional lead support the development of social routines. Social routines, in turn, provide an excellent context for facilitating social communication development. They can be established in the course of daily activities such as feeding, bathing, and dressing, as well as games and toy play. They can be unconventional and unique to a given child. The predictable structure of social routines may help children learn and remember new skills. Once children learn predictable roles in a routine, they can devote greater attention to analyzing adult models of new ways to communicate (Conti-Ramsden & Friel-Patti, 1986; Nelson, 1989). Additionally, the effectiveness of models may be enhanced because slight variations in the routine may create "moderately novel" situations that are particularly salient to young children (Piaget & Inhelder, 1969).

Research with children who are typically developing and with children who have intellectual impairments has shown that social routines are particularly powerful stimuli for linguistic (Snow, Perlmann, & Nathan, 1987; Yoder & Davies, 1992) and prelinguistic communication (Bakeman & Adamson, 1984). Once a social routine is well established with a child, adults can often elicit a high rate of requests and comments by interrupting or modifying the routine. Social routines also provide a natural context for modeling these communication functions and related skills such as turn taking.

Component 1: Prelinguistic Milieu Teaching

The overall goal of PMT is to help children establish and/or increase the frequency, clarity, and complexity of their nonverbal communicative acts. Although it is possible to categorize these acts in many ways, PMT focuses on two broad types of acts: requests and comments. *Requests* are instrumental acts in which the child seeks some object or action. In contrast, *comments* are more purely social acts that seek only to share observations and experiences with a partner.

In Table 3.1, we break down the basic goal of increasing the frequency, clarity, and complexity of the child's nonverbal communicative acts into five

Table 3.1. Prelinguistic milieu teaching procedures

Intermediate goal	Specific techniques
1. Establish routines to serve as the context for communicative acts (see DVD Clip 1)	A. Imitate the child's motor acts B. Imitate the child's vocal acts C. Interrupt the child's established pattern of actions with an adult turn, and then wait for the child to take a turn D. Perform an action the child finds funny or interesting; pause, then repeat to get more laughter E. When the child produces one part of the routine, oblige by performing the act needed to complete it
2. Increase the frequency of nonverbal vocalizations (see DVD Clips 2–4)	A. Recast the child's nonverbal vocalization with a word if the child is focused on a clear referent B. During vocal play activities (i.e., when the vocalizations are not part of a communicative act), model vocalizations with sounds and word shapes known to be outside the child's repertoire C. Model a sound within the child's sound and word shape repertoire when the vocalizations are not part of a communicative act D. Imitate the child's spontaneous vocalizations with sounds and syllable shapes known to be within the child's repertoire when the vocalizations are not part of a communicative act E. Imitate the child's spontaneous vocalizations as precisely as possible when the vocalizations are not part of a communicative act
3. Increase the frequency and spontaneity of coordinated eye gaze (see DVD Clips 5–7)	Create a need for communication within a routine in which the child looks at the object, then: A. Provide the child with the desired object or action contingent on looking B. Verbally prompt for eye gaze C. Move the desired object to the adult's face to encourage a more explicit look D. Intersect the child's gaze by moving the adult's face into the child's line of regard E. Once the child complies, explicitly acknowledge the child's look with fun and well-pleased affect F. If, after using the methods above, the child fails to produce the targeted act, provide the child with the desired object or action
4. Increase the frequency, spontaneity, and range of conventional and nonconventional gestures (see DVD Clips 8–10)	Create a need for communication within a routine (e.g., by placing a desired object out of reach), then: A. Provide the child with the desired object or action contingent on the use of a gesture B. Pretend not to understand by looking and gesturing quizzically and saying "What?" or "What do you want?" C. Ask or tell the child to be more specific (e.g., "Show me which one!" "Which one do you want?") D. Tell the child, explicitly, to produce a particular gesture (e.g., "Show me!" "Give it to me!") E. Model an appropriate gesture

	F. Once the child complies, verbally acknowledge child's gesture
	G. If, after using the methods above, the child fails to produce the targeted act, provide the child with the desired object or action
5. Combine components of intentional communication acts. The three components of intentional communication acts are eye contact with partner, vocalization, and gesture (see DVD Clips 11–13)	A. If the child produces one or two components of a communication act, wait expectantly (i.e., use time delay) to prompt the second (or third) component
	B. If the child produces one or two components of a communication act and does not add another component after the time delay: • Ask, "what do you want?" or another general prompt and wait again • Intersect the child's gaze or use the child's name to prompt eye gaze • Model or help the child to produce a gesture • If the child has produced a communicative act that is focused clearly on an object, attribute, or event, the clinician should recast the act by producing a word • If the child produces components yielding a communicative act, the clinician should not produce a nonverbal model • Immediately after the child produces the targeted component, provide the appropriate consequence and verbal feedback, as described under intermediate goals 1–4 above • If, after using the methods above, the child fails to produce the targeted act, provide the child with the desired object or action

intermediate goals. The first intermediate goal is to establish and maintain social routines (as discussed in the preceding section). The next three intermediate goals are to increase the frequency and spontaneity of the three basic components of prelinguistic requesting and commenting acts. These basic components are nonlinguistic vocalizations, coordinated eye gaze, and conventional and unconventional gestures. *Nonlinguistic vocalizations* are defined as either canonical (syllables with a true consonant, e.g., [ba]) or noncanonical (syllables with only vowel-like sounds or glides, e.g., [a], [m:], [wa]). *Coordinated eye gaze* refers to a child's alternating attention between an object or event of interest and the adult. For example, a child might hear a noise outside, look toward the window, and then look toward the adult. *Unconventional gestures* are hand movements that are highly contextual. These include reaches, proximal points (touching an object with index finger extended), pantomiming an action, giving objects to an adult, and moving objects toward or away from an adult. *Conventional gestures* include intentionally communicative acts, such as a headshake or nod, a hand wave (e.g., *hi*), an upturned palm (e.g., *gimme*), or a point to a distal object. Finally, the fifth intermediate objective is to help the child combine these three

nonlinguistic components into increasingly complex and clear requests and comments.

Three principle procedures are used to address all of the intermediate goals and, ultimately, the overall goal of clear, frequent, intentional communication (see Table 3.1). These are *prompts, models,* and *natural consequences.*

Prompts Prompts are used to evoke intentional communication attempts by the child or to evoke specific components of intentional communication (i.e., vocalizations, coordinated eye gaze, gestures). They take the form of time delay, nonverbal prompts, and verbal prompts, all of which can be used to encourage more frequent and/or complex nonverbal communication attempts. A time delay for initiation is a type of nonverbal prompt that often functions as an interruption of an ongoing turn-taking routine. For example, if a child and adult were playing a tickling game, the adult might hold her hands away from the child to interrupt this routine, then look at the child expectantly until the child initiates a request to continue the routine (see DVD Clip 10). Examples of other nonverbal prompts include holding out an upturned palm (e.g., to get the child to give an object; see DVD Clip 8), moving an object of the child's interest near or directly in line with the adult's face (e.g., to get the child to look at the adult), or physically intersecting the child's line of regard in order for the child to look at the adult (see DVD Clip 6). Verbal prompts for communication can be open-ended questions (e.g., "What?" see DVD Clip 12) or direct commands (e.g., "Show/tell me") intended to elicit communication responses. Verbal prompts also can be used to elicit a specific component of communication. For example, when a young child makes a request without eye contact, the directive, "Look at me" or the child's name may be used to evoke eye contact. If a child does not respond to a prompt, or reacts aversively to a prompt, it is best not to persist with the interaction.

Models Models are used to support and enhance the vocal and gestural topography of the child's intentional communication attempts. Vocal models of sounds that the adult has heard the child produce (e.g., [ba]) can be used during a motor act that is not focused on a clear referent or is not otherwise part of a child's communicative act. For example, while the child is banging a stick, the clinician might model [baba]. To ensure that the child does not misinterpret the adult's nonlinguistic vocalization as an actual label, it is important that nonlinguistic models are only given in the absence of clear referents. For example, if the adult models [bababa] while the child points to a dog, the child may be induced to think that the label for dog is [ba]. Gestural models are used to encourage the child to use and imitate gestures. For example, when an airplane passes overhead, the adult might point

to it as a model for the child to use pointing as an element of commenting (see DVD Clips 9 and 10 for additional examples).

Providing Natural Consequences PMT is based on milieu teaching (MT), which is a form of language intervention for children learning words and early grammatical structures (Warren & Bambara, 1989). It differs most dramatically from MT in that the targeted behaviors for PMT are nonverbal acts; in contrast, in MT, the clinician will prompt and provide the child's desired consequences only for verbal acts. Thus, for PMT, nonverbal communication attempts that are appropriately clear and complex should be consequated in accordance with their intent: child requests should yield the desired objects and actions, and child comments should result in adult attention to the child's topic. Continued attention and interaction by the adult are assumed.

These natural consequences may be supplemented with specific acknowledgment and/or by a verbal recast of the child's meaning (i.e., linguistic mapping). Specific acknowledgment is provided by a smile and comment after the child produces a targeted intentional communication component. For example, when a child makes eye contact with a caregiver in the course of initiating a request, the caregiver might break into a big smile and comment, "You looked at me!" while responding to the child's request (see DVD Clips 5, 6, and 7). Frequent use of specific acknowledgment may disrupt the flow of interaction, and praise statements tend to lose their meaning for recipients if used too frequently. Therefore, these statements should be used primarily when a child is first acquiring a new behavior and infrequently thereafter.

Linguistic mapping occurs when the adult verbalizes the core meaning of the immediately preceding child communication act. For example, a child might point to a photo on a shelf for the adult to see (a comment), and the adult might respond, "Yes, that's Thomas" (see DVD Clip 9). Research with both typically and atypically developing children has indicated that linguistic mapping can be a powerful contributor to vocabulary development (Nelson, 1989). Therefore, we encourage the frequent use of linguistic mapping as part of adult responses to intentional communication attempts.

Teaching Intentional Communication The specific principles and procedures we have described should be embedded into ongoing interactions and used as dictated by the context and the child's current communication goals. Some specific techniques may be used quite frequently (e.g., linguistic mapping); others, only until the child begins to intentionally use the targeted skill (e.g., intersection of gaze). However, the enabling procedures of arranging the environment, following the child's attentional lead, and social routine building are to be used whenever possible and will continue to play an important role when efforts shift toward language goals (Warren, 1991).

It is important to remember that the frequency and quality of children's engagement with objects of interest and their conversational partners (i.e., their routines) will determine the occasions for the use of any specific technique. Prompts are used only when motivation to communicate is high (e.g., when the child is intently engaged in social interaction). Additional consequences can follow any intentional communication attempt. Specific teaching episodes should be brief, positive, and embedded in the ongoing stream of interaction. If a child is not responsive to a prompt, it is best to desist and move on with the interaction. The procedures outlined in Table 3.1 illustrate a kind of hierarchy, with the techniques requiring the most sophisticated child responses described first. Children who respond reliably to these high level techniques may not require the procedures that fall lower in the hierarchy. On the other hand, when a child does not respond to the higher-level procedures, the clinician must fall back to the lower steps, providing the child with more scaffolding. Once the child begins to respond reliably to this level of assistance, the clinician gradually adopts higher level procedures that place more responsibility on the child. This general method of utilizing the steps in Table 3.1 is exemplified in the case example later in this chapter.

Teaching Proto-imperatives It is helpful to first establish social routines that involve turn taking between the adult and child (e.g., rolling a ball back and forth, dropping blocks into a container, or playing a musical instrument). Once an initial set of routines has been established and a particular instance of a given routine has gone on for at least two turns, the adult may stop the routine by withholding his or her turn and looking expectantly at the child (a time delay for initiation). A verbal prompt also might be given, such as "What?" (to start the activity) or "Do you want this?" (while maintaining eye contact and holding up an object the child needs to resume the activity). If there is not an appropriate response to the interruption of the routine, or if the child's response is incomplete (i.e., it is missing a component necessary to be considered intentional communication), then the adult may provide further assistance to the child. For example, if the child looks at a toy and reaches toward it or provides a vocalization, but does not make eye contact with the adult, then the adult might say, "Look at me," intersect the child's gaze, or move the toy near the adult's face. The adult also might provide a gestural model if needed to complete the communication act. Once the child begins to request across different routines intentionally, then prompts, models, and specific acknowledgments should be faded out. Linguistic mapping should continue as part of the adult's response to the requests, however.

Teaching Proto-declaratives Proto-declaratives are taught in a decidedly different manner from proto-imperatives (Yoder & Warren, 1999b). The primary motivation for a proto-declarative is recruitment of another's attention and the sharing of an affective state. Our experience suggests that it is

often necessary for young children to first develop a positive relationship with an adult before they will initiate proto-declaratives to the adult frequently. Of course, proto-declaratives may be modeled at any time.

Proto-declaratives are taught by modeling and by providing situations likely to stimulate their use, or in some contexts by directly prompting with physical assistance (e.g., prompting a distal point by physically assisting the child; see DVD Clip 9). One such situation is the introduction of novel events or objects. This can take many forms such as adding new toys or items within routines (which can be done frequently), taking advantage of occasional occurrences of silly or unusual events (planned or unplanned), a sabotaged routine, a walk, or a ride in the car. The clinician can model a proto-declarative by pointing to an object or novel event and directing the child to look. The clinician should also linguistically map the object or event as a part of this modeling technique. The clinician can model proto-declaratives concurrent with or just after the novel event of interest. On occasion, when something novel occurs, the adult may pretend not to notice. The intent in this case is to set up a situation in which the child feels the need to direct the adult's attention to the object or event. Yet another approach is to seed an area with interesting, novel objects and let the child have the run of the room for a few minutes, but with the adult clearly observing from a short distance away. As the child discovers novel items in this manner, the child may then comment to the adult. However, our clinical observation has been that, by far, the majority of proto-declaratives occur about an object or event that the child has reason to believe the adult is already attending to. That is, they occur in a context in which the child and adult are engaged in joint attention (Carpenter, Nagell, & Tomasello, 1998).

To summarize, it is important to remember that PMT procedures should be embedded into ongoing social and play routines that represent the enabling contexts described earlier. Furthermore, procedures should be goal-driven. Specific procedures may work well with some goals and poorly with others. Also, clinicians should carefully monitor for and avoid any tendency to use the procedures in a didactic or directive manner. The effectiveness of these procedures depends in part on having a high level of child engagement that is best maintained by following the child's attentional lead at all times.

Component 2: Responsive Interaction Training

There is considerable correlational evidence (Landry et al., 1997; Murray & Hornbaker, 1997; Smith, Landry, Miller-Loncar, & Swank, 1997) and some experimental evidence (Landry, Smith, & Swank, in press; Yoder, Warren, McCathren, & Leew, 1998) suggesting that an optimal style of parenting for promoting social and cognitive competence is one that fosters reciprocal interactions between parent and child. Such an interaction style allows the child to have some degree of control over the interaction. Responsive interaction techniques (see Chapter 4; Wilcox & Shannon, 1998) are intended to

create just such an optimal style in caregivers. This approach is widely used in parent training. It Takes Two to Talk—The Hanen Program for Parents (Manolson, 1992) is an excellent example of such an approach. Its major goal is to increase the child's social communication skills by enhancing the quality of interaction between the adult and the child, and it has been shown to be effective in helping parents of children with developmental delays reach this goal (see Chapter 4).

Responsive interaction techniques also have been referred to as *interactive modeling* (Wilcox, Kouri, & Caswell, 1991). As with PMT, these techniques require the provision of *enabling contexts* (e.g., following the child's attention lead), described earlier in this chapter, to maximize their effectiveness. Linguistic mapping also is strongly encouraged. However, responsive interaction approaches generally discourage the direct elicitation of specific child responses via requests to imitate, or even in some cases the use of test questions (e.g., "What is that?"). Focused input is provided based on the child's attentional lead. This input may include models in the form of descriptive talk or linguistic mapping.

In our current research, parents receive 8–10 sessions of RE over a 6-month period. This training is provided by an SLP who has been trained to conduct The Hanen Parent Training Program. However, our approach represents an adaptation of The Hanen Program, not an attempt to directly replicate it. The training sessions are conducted in the parent's home. The initial goal for these sessions is to develop a sense of trust between the clinician and the parent. In our experience, if this trust is not established initially, it can be difficult for the parent to accept the information or apply it to his or her interactions with the child. The clinician and the parent spend some time just getting to know each other through conversation that does not necessarily focus on the child or the intervention. Self-disclosure on the clinician's part and listening to the parent regardless of the topic serve as effective tools to establish the environment for open and honest communication.

Once the clinician–parent relationship is established, the focus of the sessions moves to the direct teaching of responsive interaction techniques. In order to implement these techniques, it is imperative that the parent have a clear understanding of his or her child's intentional communication. To illustrate this point, the clinician may point out instances of intentional communication from videotaped PMT sessions with the child. Parents begin RIT with varied skill levels in terms of how they interact with their child. For example, some parents are proficient in following their child's lead but struggle with allowing their child adequate time to communicate. Other parents experience difficulty following their child's lead during play activities, whereas a few parents are proficient in most of the responsive interaction techniques before beginning the intervention and need just a little fine tuning. In our experience, the most difficult technique for many parents to apply is allowing their child adequate time to communicate. Videotaped sessions of the parent

and child playing together are viewed so the clinician and parent can identify instances of high and low responsivity to child initiations. These viewings should be interaction and parent driven to the extent possible to maintain the team-based relationship rather than the teacher–student relationship. The clinician provides cues to direct the parent to specific instances of high or low responsivity.

ASSESSMENT METHODS TO SUPPORT ONGOING DECISION MAKING

Children's communication skills will advance to the point where PMT is no longer the appropriate intervention. To determine a child's readiness to move from PMT to an early language intervention such as MT, several factors must be considered. A decrease in the amount of prompting needed is often the first indication that a child may be ready for language intervention. In addition, the overall rate of intentional communication should be approaching 2 acts per minute in a social interaction play situation. This can be determined by watching the child interact with the parent or another adult and counting the number of intentional communication acts over a 5- or 10-minute period. These acts should include proto-declaratives as well as proto-imperatives. Most communicative acts should include all three components (gazes, gestures, and canonical vocalizations). Our impression is that children with high rates of gesture and mutual gaze are appropriate candidates for language intervention, even if their rates of canonical vocalization are very low. This observation is consistent with Yoder and Warren's (2002) finding that children who produced high rates of communication acts prior to intervention responded better without PMT than they did with it. For many such children with limited phonetic capabilities, this will be the appropriate time to make a decision whether an augmentative or alternative communication system would be best for the child and, if so, what kind of system would likely be most effective.

During the course of PMT, the clinician should also note an increase in the range of consonants and vowels in the child's phonetic inventory and the use of a large variety of gestures, including distal point, contact point, give, reach, wave, as well as other nonconventional gestures. These factors can be determined during the course of an intervention session as opposed to conducting a lengthy evaluation.

CONSIDERATIONS FOR CHILDREN FROM CULTURALLY AND LINGUISTICALLY DIVERSE BACKGROUNDS

RE/PMT and the two intervention components described earlier reflect a set of biases about social communication development and the appropriate roles of caregivers and practitioners. The acceptability of these procedures, and hence their ultimate effectiveness, may vary in some cases because of differ-

ences in cultural values and beliefs (Johnston & Wong, 2002; van Kleeck, 1994). Early social-communication intervention may be even more susceptible to problems associated with cultural differences than other forms of intervention for two reasons. First, it often takes place within the family context and carries an expectation that the caregivers will play an active role and even adopt a style of interaction with their child that may directly violate some of their views of appropriate parent–child interaction (Bornstein, 1989). Second, the focus on communication and language development and differences is inherently one of the most sensitive areas for cross-cultural discourse. A range of basic SES and ethnic differences is frequently manifested in language differences (Heath, 1986). Furthermore, even a basic goal such as *increase the child's rate of communicative initiations* can be problematic. For example, in her study of the Inuit in northern Canada, Crago (1990) found that "talkativeness" by young children was considered a sign of a "learning problem" by their parents and was discouraged.

We presume that many if not most potential sources of bias can be limited or at least identified through the careful collection and consideration of information on individual family values, beliefs, and desires. This information then can be used to modify intervention strategies to enhance their acceptability and thus their ultimate effectiveness. For example, in the Inuit culture mentioned previously, it may be most appropriate to involve older siblings or other caregivers in RE rather than parents. Older youths to whom children might be expected to speak frequently also might be trained to perform PMT under an SLP's supervision. A thorough consideration of individual family differences should be a given with all families, irrespective of their cultural or ethnic background. Thus, embracing this perspective should place no additional burden on practitioners. It is in fact completely congruent with the notion of individualizing efforts to meet the unique needs of the family and child, a widely held tenet of early intervention practices in many countries and cultures (Odom & McLean, 1996).

APPLICATION TO AN INDIVIDUAL CHILD

Bonnie, age 27 months, was born 14 weeks prematurely. Her cognitive skills were at the 13-month level as determined by the Bayley Scales of Infant Development (Bayley, 1993). Bonnie's motor skills were also delayed; she was unable to walk but sat unassisted. She grasped objects in either hand and transferred objects from one hand to the other. During the initial communication assessment, Bonnie produced an average of 1 vocalization per minute; however, these vocalizations were not directed to an adult and typically were judged to be noncanonical syllables because they did not contain a true consonant. Her rate of canonical vocalizations was 0.51 per minute. Bonnie's gestures included holding up her arms to request being lifted by an adult and reaching for objects. When she could not reach an object she wanted, she vo-

calized in protest but did not look to an adult for assistance. She averaged 0.21 proto-declaratives and 0.76 proto-imperatives per minute.

Bonnie was enrolled in PMT for four 20-minute sessions weekly. RE was also provided to her mother 1–2 times per month. The first intermediate goal for Bonnie was to establish turn-taking routines to serve as a context for communication (see intermediate goal 1, Table 3.1). Bonnie enjoyed shaking and patting musical instruments, so the clinician began by imitating Bonnie's actions (specific technique 1A, Table 3.1). The clinician continued this activity with a variety of toys until Bonnie noticed the clinician's actions and began to vary her own actions more frequently. The clinician then introduced turn taking by only having one toy available; the clinician played with the toy in a way she had seen Bonnie play with it, then immediately moved the toy to lie within her range of grasp. Once Bonnie had played with the toy for several seconds, the clinician took the toy and played with it for a few seconds. The clinician then placed the toy near Bonnie again (specific technique 1C, Table 3.1).

Once this routine was firmly established, the clinician moved on to intermediate goals 2–4 (see Table 3.1), which address the individual components of proto-imperatives (i.e., requesting) and proto-declaratives (i.e., commenting). Bonnie did not use alternating gaze yet, so intermediate goal 3 was targeted first. The clinician lifted a desired toy close to her face so that Bonnie did not have to look far to make eye contact (specific technique 3C, Table 3.1). It was often necessary to intersect Bonnie's line of vision as well (specific technique 3D, Table 3.1). As soon as Bonnie alternated her gaze from the toy to the clinician, the clinician praised her for looking and gave her the toy (specific technique 3E, Table 3.1). Eventually the clinician was able to hold the toy farther away from her face, requiring Bonnie to look from the toy back to the adult.

Although alternating eye gaze (i.e., intermediate goal 3, Table 3.1) was targeted during the initial few sessions, once predictable routines had been established, intermediate goals 2–4 were addressed concurrently during each successive session. Different established routines allowed for elicitation of different individual components. To encourage canonical vocalizations (i.e., intermediate goal 2, Table 3.1), the clinician began by imitating Bonnie's vocalizations, often while she held a toy, such as a Slinky or a tube, up to her face (specific technique 2E, Table 3.1). This use of the toy made the vocal play activity more of a game and directed Bonnie's attention to the clinician's mouth. The clinician vocalized into the Slinky, stacking ring, or cup, then handed the toy back to Bonnie for her to take a turn. In later sessions, the clinician followed Bonnie's vocalization with one or more syllables that differed from Bonnie's by adding consonant sounds. At first, these sounds were those Bonnie sometimes used (specific technique 3C, Table 3.1). Later, new sounds not yet in Bonnie's babbling repertoire were added (specific technique 3B, Table 3.1). To address intermediate goal 4 (i.e., use of gestures),

the clinician employed the enabling context of arranging the environment so that desired toys were in sight but out of reach. The clinician then modeled both contact points and distal points and encouraged Bonnie to produce these to request the toys (specific technique 4E, Table 3.1). Proto-declaratives were also targeted in this way by having a toy perform an unexpected action. The clinician then modeled a distal point and said, "Look." To encourage the gesture of a give, toys were placed in clear bags or jars that were difficult to open. It was often necessary for the clinician to prompt for a give by extending her hands and asking Bonnie if she needed help (specific technique 4E, Table 3.1). After 2 months, the clinician no longer needed to model a gesture; she simply asked Bonnie to show her which toy she wanted (specific technique 4C, Table 3.1).

Once Bonnie began to readily produce each individual component of an intentional communication act, the clinician moved on to intermediate goal 5 (see Table 3.1). For example, when Bonnie alternated her gaze from a desired toy to the clinician, the clinician prompted for a canonical vocalization by saying "What?" As soon as Bonnie produced a canonical vocalization, the clinician gave her what she wanted and labeled the object ("Oh, you want the Slinky"). Similarly, if Bonnie used a contact point to request an object, the clinician called her name to prompt for an alternating gaze to accompany the gesture. The object was supplied only after Bonnie looked up at the clinician.

After 6 months of PMT, Bonnie was producing intentional communication acts at a rate of 2.0 per minute to make both proto-imperatives and proto-declaratives. The number of prompts that were required and the length of time for waiting during the time-delay technique had decreased greatly. Bonnie's rate of canonical vocalizations increased to 1.3 per minute. At this time, it was determined that she met the criteria to move into language intervention, and her goals shifted to productive word acquisition and use.

FUTURE DIRECTIONS

Relative to early language intervention, very little research has been conducted on RE/PMT. Furthermore, although this approach clearly holds great potential, we do not yet know its true value or what type of children benefit the most from it.

We are presently conducting a longitudinal experimental study to determine whether RE/PMT generates a great enough impact on long-term development of young children with developmental delays to warrant its widespread clinical and educational application. In this study, we are comparing two groups of 2-year-olds with developmental disabilities. In one group, the children receive 6 months of PMT and the parents receive RE. The other group receives no treatment through our project. Twelve months after entry into our program, all children receive 6 months of milieu language interven-

tion to supplement what they get through the schools. We are interested in comparing the performance of children in these two groups at each 6-month interval in terms of their rates of communication acts and, at the later time points, their language abilities. We will have the results of this research in 2006. Meanwhile, Paul Yoder is conducting an analysis of the effects of RE/PMT with young children with autism. These studies should go a long way toward indicating the potential of RE/PMT in general. However, there is already clear evidence of its efficacy for at least some individuals, most notably those that do not communicate very frequently at the outset and who have highly responsive parents.

Most of the research on RE/PMT has been conducted by only a handful of individuals in a few locations. Reliable knowledge of the effects and effectiveness of RE/PMT as well as the development of a full range of specific intervention procedures will require an expanded effort conducted by additional investigators in different settings with varied populations. Finally, the question of whether increasing the intensity of RE/PMT will generate substantial increases in its effects remains to be answered. The prelinguistic intervention we have described in this chapter involves 60–80 minutes per week of the clinician actually working one on one with the child. The minimal intensity of this intervention should be obvious. A recent report by a committee of the National Research Council (2001) suggests that young children with autism receive 25 hours of direct intervention per week to achieve maximal effects. We have no idea what the optimal intensity of RE/PMT for children with developmental delays might be, but surely it is more than 80 minutes per week. Consequently, in 2005 we (Warren, Fey, and Yoder) began a 5-year longitudinal experimental intervention study of RE/PMT with random assignment to high-intensity (5 hours of direct intervention per week) and low-intensity (1 hour per week) conditions with the support of the National Institute of Deafness and Other Communicative Disorders.

RECOMMENDED READING

Wetherby, A.M., Warren, S.F., & Reichle, J. (Vol. Eds.). (1998). In S.F. Warren & J. Reichle (Series Eds.), *Communication and language intervention series: Vol. 7. Transitions in prelinguistic communication.* Baltimore: Paul H. Brookes Publishing Co.

REFERENCES

Ainsworth, M.S., Blehar, M.C., Waters, E., & Wall, S. (1978). *Patterns of attachment: A psychological study of the strange situation.* Hillsdale, NJ: Lawrence Erlbaum Associates.

Bailey, D.B., Aytch, L.S., Odom, S.L., Symons, F., & Wolery, M. (1999). Early intervention as we know it. *Mental Retardation and Developmental Disabilities Research Reviews, 5*, 11–20.

Bakeman, R., & Adamson, L.B. (1984). Coordinating attention to people and objects in mother-infant and peer-infant interaction. *Child Development, 55*(4), 1278–1289.

Bates, E., Benigni, L., Bretherton, I., Camaioni, L., & Volterra, V. (1979). *The emergence of symbols: Cognition and communication in infancy.* New York: Academic Press.

Bayley, N. (1993). *Bayley Scales of Infant Development* (2nd ed.). San Antonio, TX: Harcourt Assessment.

Bell, R., & Harper, L. (1977). *Child effects on adults.* Hillsdale, NJ: Lawrence Erlbaum Associates.

Bornstein, M.H. (1989). *Maternal responsiveness: Characteristics and consequences. New directions for child development.* San Francisco: Jossey-Bass.

Brooks-Gunn, J., & Lewis, M.H. (1984). The development of early visual self-recognition. *Development Review, 4*(3), 215–239.

Bruner, J.S., Roy, C., & Ratner, R. (1980). The beginnings of request. In K.E. Nelson (Ed.), *Children's language* (Vol. 3, pp. 91–138). New York: Gardner Press.

Carpenter, M., Nagell, K., & Tomasello, M. (1998). Social cognition, joint attention, and communicative competence from 9–15 months of age. *Monographs of the Society for Research in Child Development, 63*(4), v–174.

Conti-Ramsden, G., & Friel-Patti, S. (1986). Mother-child dialogues: Considerations of cognitive complexity for young language learning children. *British Journal of Disorders of Communication, 21*(2), 245–255.

Crago, M. (1990). Development of communicative competence in Inuit children: Implications for speech-language pathology. *Journal of Childhood Communication Disorders, 13*, 73–83.

Crawley, S.B., & Spiker, D. (1983). Mother-child interactions involving two-year olds with Down syndrome: A look at individual differences. *Child Development, 54*(5), 1312–1323.

Dawson, G., & Adams, A. (1984). Imitation and social responsiveness in autistic children. *Journal of Abnormal Child Psychology, 12*(2), 209–225.

Dawson, G., & Lewy, A. (1989). Arousal, attention and the socioemotional impairments of individuals with autism. In G. Dawson (Ed.), *Autism: Nature, diagnosis, and treatment* (pp. 49–74). New York: Guilford Press.

Farran, D. (2000). Another decade of intervention for children who are low income or disabled: What do we know now? In J. Shonkoff & S. Meisels (Eds.), *Handbook of early childhood intervention* (2nd ed., pp. 510–548). Cambridge, England: Cambridge University Press.

Feagans, L., & Farran, D.C. (1982). *The language of children reared in poverty: Implications for evaluation and intervention.* New York: Academic Press.

Fenson, L., Dale, P., Reznick, S., Thal, D., Bates, E., Hartung, J., Pethick, S., & Reilly, J. (1993). *The MacArthur-Bates Communicative Development Inventories: User's guide and technical manual.* Baltimore: Paul H. Brookes Publishing Co.

Fey, M. (1986). *Language intervention with young children.* Austin, TX: PRO-ED.

Fey, M.E., Warren, S.F., Brady, N.C., Finestack, L., Bredin-Oja, S., Sokol, S., Fairchild, M., & Yoder, P.J. (in press). Early effects of prelinguistic milieu teaching and responsivity education for children with developmental delays and their parents. *Journal of Speech, Language, and Hearing Research.*

Gazdag, G.A., & Warren, S.F. (2000). Effects of adult contingent imitation on development of young children's vocal imitation. *Journal of Early Intervention, 23*, 24–35.

Goldberg, S. (1977). Social competence in infancy: A model of parent-infant interactions. *Merrill-Palmer Quarterly, 23*, 163–177.

Gottfried, A.W. (1984). Home environment and early cognitive development: Integration, meta-analyses, and conclusions. In A.W. Gottfried (Ed.), *Home environment and early cognitive development: Longitudinal research* (pp. 329–342). New York: Academic Press.

Hart, B., & Risley, T. (1968). Establishing use of descriptive adjectives in the spontaneous speech of disadvantaged preschool children. *Journal of Applied Behavior Analysis, 1*(2), 109–120.

Hart, B., & Risley, T. (1992). American parenting of language-learning children: Persisting differences in family child interactions observed in natural home environments. *Developmental Psychology, 28*(6), 1096–1105.

Hart, B., & Risley, T. (1995). *Meaningful differences in the everyday experience of young American children.* Baltimore: Paul H. Brookes Publishing Co.

Heath, S.B. (1986). Taking a cross-cultural look at narratives. *Topics in Language Disorders, 7*(1), 84–94.

Hepting, N.H., & Goldstein, H. (1996). What's "natural" about naturalistic language intervention? *Journal of Early Intervention, 20*, 250–265.

Johnston, J.R., & Wong, M. (2002). Cultural differences in beliefs and practices concerning talk to children. *Journal of Speech, Language, and Hearing Research, 45*(5), 916–926.

Kaiser, A.P., Yoder, P.J., & Keetz, A. (1992). Evaluating milieu teaching. In S.F. Warren & J. Reichle (Series & Vol. Eds.), *Communication and language intervention series: Vol. 1. Causes and effects in communication and language intervention* (pp. 9–48). Baltimore: Paul H. Brookes Publishing Co.

Landry, S.H., Smith, K.E., Miller-Loncar, C.L., & Swank, P.R. (1997). Predicting cognitive-language and social growth curves from early maternal behaviors in children at varying degrees of biological risk. *Developmental Psychology, 33*(6), 1040–1053.

Landry, S.H., Smith, K.E., & Swank, P.R. (in press). Responsive social contexts: The origins of early communication and independent problem solving. *Developmental Psychology.*

Landry, S.H., Smith, K.E., Swank, P.R., Assel, M.A., & Vellet, S. (2001). Does early responsive parenting have a special importance for children's development or is consistency across early childhood necessary? *Developmental Psychology, 37*(3), 387–403.

MacDonald, J. (1989). *Becoming partners with children: From play to conversation.* San Antonio, TX: Special Press.

Mahoney, G., Boyce, G., Fewell, R.R., Spiker, D., & Wheeden, C.A. (1998). The relationship of parent-child interactions to the effectiveness of early intervention services for at-risk children and children with disabilities. *Topics in Early Childhood Special Education, 18*(1), 5–17.

Manolson, A. (1992). *It Takes Two to Talk.* Toronto: The Hanen Centre.

McCathren, R.B., Warren, S.F., & Yoder, P.J. (1996). Prelinguistic predictors of later language development. In S.F. Warren & J. Reichle (Series Eds.) & K.N. Cole, P.S. Dale, & D.J. Thal (Vol. Eds.), *Communication and language intervention series: Vol. 6. Advances in assessment of communication and language* (pp. 57–76). Baltimore: Paul H. Brookes Publishing Co.

McCathren, R.B., Yoder, P.J., & Warren, S.F. (1999). Prelinguistic pragmatic functions as predictors of later expressive vocabulary. *Journal of Early Intervention, 22*, 205–216.

McCathren, R.B., Yoder, P.J., & Warren, S.F. (2000). Testing predictive validity of the communication composite of the Communication and Symbolic Behavior Scales. *Journal of Early Intervention, 23*, 36–46.

McLean, J.E., & Snyder-McLean, L. (1978). *A transactional approach to early language training.* Columbus, OH: Charles E. Merrill.

Murray, A.D., & Hornbaker, A.V. (1997). Maternal directive and facilitative interaction styles: Associations with language and cognitive development of low risk and high risk toddlers. *Development and Psychopathology, 9*(3), 507–516.

National Research Council. (2001). *Educating children with autism.* Committee on Educational Interventions for Children with Autism. Division of Behavioral Social Sciences and Education. Washington, DC: National Academy Press.

Nelson, K.E. (1989). Strategies for first language teaching. In M.L. Rice & R.L. Schiefelbusch (Eds.), *The teachability of language* (pp. 263–310). Baltimore: Paul H. Brookes Publishing Co.

Odom, S.L., & McLean, M.E. (1996). *Early intervention/early childhood special education recommended practices.* Austin, TX: PRO-ED.

Piaget, J., & Inhelder, B. (1969). *The psychology of the child.* New York: Basic Books.

Prizant, B., & Wetherby, A.M. (1990). Toward an integrated view of early language and communication development and socioemotional development. *Topics in Language Disorders, 10*(4), 1–16.

Reynell, J.K., & Gruber, C.P. (1990). *The Reynell Developmental Language Scales, U.S. Edition.* Los Angeles: Western Psychological Services.

Rosenberg, S., & Abbeduto, L. (1993). *Language and communication in mental retardation: Development, processes, and intervention.* Hillsdale, NJ: Lawrence Erlbaum Associates.

Sameroff, A.J., & Chandler, M.J. (1975). Reproductive risk and the continuum of caretaking casualty. In F.D. Horowitz, E. Hetherington, S. Scarr-Salapatek, & G. Siegel (Eds.), *Review of child development research* (Vol. 4, pp. 187–244). Chicago: University of Chicago Press.

Saxon, T., Colombo, J., Robinson, E.L., & Frick, J.E. (2000). Dyadic interaction profiles in infancy and preschool intelligence. *Journal of School Psychology, 38*, 9–25.

Smith, K.E., Landry, S.H., Miller-Loncar, C.L., & Swank, P.R. (1997). Characteristics that help mothers maintain their infants' focus of attention. *Journal of Applied Developmental Psychology, 18*(4), 587–601.

Snow, C.E. (1989). Imitativeness: A trait or a skill? In G.E. Speidel & K.E. Nelson (Eds.), *The many faces of imitation in language learning.* New York: Springer-Verlag.

Snow, C.E., Perlmann, R., & Nathan, D. (1987). Why routines are different: Towards a multiple factors model of the relation between input and language acquisition. In K.E. Nelson & A. van Kleeck (Eds.), *Child language* (Vol. 6, pp. 65–97). Hillsdale, NJ: Lawrence Erlbaum Associates.

Tamis-LeMonda, C.S., Bornstein, M.H., Baumwell, L., & Melstein Damast, A. (1996). Responsive parenting in the second year: Specific influences on children's language and play. *Early Development and Parenting, 5*(4), 173–183.

Tannock, R., Girolametto, L., & Siegel, L.S. (1992). Language intervention with children who have developmental delays: Effects of an interactive approach. *American Journal on Mental Retardation, 97*, 145–160.

van Kleeck, A. (1994). Potential cultural bias in training parents as conversational partners with their children who have delays in language development. *American Journal of Speech-Language Pathology, 31*, 67–78.

Walker, D., Greenwood, C., Hart, B., & Carta, J. (1994). Prediction of school outcomes based on early language production and socioeconomic factors. *Child Development, 65*(2 Spec No), 606–621.

Warren, S.F. (1991). Enhancing communication and language development with milieu teaching procedures. In E. Cipani (Ed.), *A guide for developing language competence in preschool children with severe and moderate handicaps* (pp. 68–93). Springfield, IL: Charles C Thomas.

Warren, S.F., & Bambara, L.M. (1989). An experimental analysis of milieu language intervention: Teaching the action-object form. *Journal of Speech and Hearing Disorders, 54*(3), 448–461.

Warren, S.F., & Yoder, P.J. (1998). Facilitating the transition to intentional communication. In S.F. Warren & J. Reichle (Series Eds.) & A.M. Wetherby, S.F., Warren, & J. Reichle (Vol. Eds.), *Communication and language intervention series: Vol. 7. Transitions in prelinguistic communication* (pp. 365–385). Baltimore: Paul H. Brookes Publishing Co.

Warren, S.F., Yoder, P.J., Gazdag, G.E., Kim, K., & Jones, H.A. (1993). Facilitating prelinguistic communication skills in young children with developmental delay. *Journal of Speech and Hearing Research, 36*(1), 83–97.

Wetherby, A., Allen, L., Cleary, J., Kublin, K., & Goldstein, H. (2002). Validity and reliability of the communication and symbolic behavior scales developmental profile with very

young children. *Journal of Speech, Language, and Hearing Research, 45*(6), 1202–1218.

Wetherby, A.M., & Prizant, B.M. (1993a). *Communication and Symbolic Behavior Scales™ (CSBS).* Baltimore: Paul H. Brookes Publishing Co.

Wetherby, A.M., & Prizant, B.M. (1993b). Profiling communication and symbolic abilities in young children. *Journal of Childhood Communication Disorders, 15*(1), 23–32.

Wilcox, M., Kouri, T., & Caswell, S. (1991). Early language intervention: A comparison of classroom and individual treatment. *American Journal of Speech-Language Pathology, 1*, 49–62.

Wilcox, M., & Shannon, M. (1998). Facilitating the transition from prelinguistic to linguistic communication. In S.F. Warren & J. Reichle (Series Eds.) & A.M. Wetherby, S.F. Warren, & J. Reichle (Vol. Eds.), *Communication and language intervention series: Vol. 7. Transitions in prelinguistic communication* (pp. 385–416). Baltimore: Paul H. Brookes Publishing Co.

Yoder, P.J., & Davies, B. (1992). Do children with developmental delays use more frequent and diverse language in verbal routines? *American Journal on Mental Retardation, 97*(2), 197–208.

Yoder, P.J., Davies, B., & Bishop, K. (1994). Reciprocal sequential relations in conversations between parents and children with developmental delays. *Journal of Early Intervention, 18*(4), 362–379.

Yoder, P.J., & Warren, S.F. (1998). Maternal responsivity predicts the extent to which prelinguistic intervention facilitates generalized intentional communication. *Journal of Speech, Language, and Hearing Research, 41*(5), 1207–1219.

Yoder, P.J., & Warren, S.F. (1999a). Maternal responsivity mediates the relationship between prelinguistic intentional communication and later language. *Journal of Early Intervention, 22*, 126–136.

Yoder, P.J., & Warren, S.F. (1999b). Self-initiated proto-declaratives and proto-imperatives can be facilitated in prelinguistic children with developmental disabilities. *Journal of Early Intervention, 22*, 337–354.

Yoder, P.J., & Warren, S.F. (2001). Relative treatment effects of two prelinguistic communication interventions on language development in toddlers with developmental delays vary by maternal characteristics. *Journal of Speech, Language, and Hearing Research, 44*(1), 224–237.

Yoder, P.J., & Warren, S.F. (2002). Effects of prelinguistic milieu teaching and parent responsivity education on dyads involving children with intellectual disabilities. *Journal of Speech, Language, and Hearing Research, 45*(6), 1158–1174.

Yoder, P.J., Warren, S.F., & Hull, L. (1995). Predicting children's response to prelinguistic communication intervention. *Journal of Early Intervention, 19*(1), 74–84.

Yoder, P.J., Warren, S.F., Kim, K., & Gazdag, G.E. (1994). Facilitating prelinguistic communication skills in young children with developmental delay. II: Systematic replication and extension. *Journal of Speech and Hearing Research, 37*(4), 841–851.

Yoder, P.J., Warren, S.F., McCathren, R.B., & Leew, S. (1998). Does adult responsivity to child behavior facilitate communication development? In S.F. Warren & J. Reichle (Series Eds.) & A.M. Wetherby, S.F. Warren, & J. Reichle (Vol. Eds.), *Communication and language intervention series: Vol. 7. Transitions in prelinguistic communication* (pp. 39–58). Baltimore: Paul H. Brookes Publishing Co.